

James M. Rosado

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Summary

Applied Research Mathematician and Software Developer with over a decade of experience spanning academic research, national security, and computational neuroscience. Holds active Top Secret/SCI clearance and a Ph.D. in Mathematics from Temple University. Proven expertise in mathematical modeling, algorithm design, high-performance computing, and AI/ML systems integration using Python, C/C++, MPI, and OpenMP. Demonstrated success delivering impactful software across government and academic sectors, including VR-based neuron simulations, graph-based query systems, and machine learning recommendation engines. Recognized with multiple awards for software engineering excellence at the NSA. Published author in leading journals and contributor to open-source neuroscience tools. Experienced educator and mentor with a commitment to innovation, cross-disciplinary collaboration, and scientific communication.

Education

Temple University, Ph.D. in Mathematics	Sep. 2017 – June 2022
Rowan University, M.A. in Mathematics	Sep. 2012 – June 2016
NJ Department of Education, Teacher of Mathematics Certificate	Sep. 2008 – Sep. 2009
Rutgers University, B.S. in Electrical and Computer Engineering	Sep. 2003 – June 2007
Pitman High School, High School Diploma	Sep. 1999 – June 2003

Experience

Applied Mathematician, U.S. Government / Department of Defense / NSA – Maryland, USA Sep. 2022 – Present

- Conducts applied research and software development across various NSA branches with active TS/SCI clearance
- Developed graph-based query algorithms; collaborated with LLNL on integration with in-house software
- Built ML-based article recommendation systems using Python, Scikit-learn, TensorFlow, and PyTorch
- Received multiple agency awards for software engineering and machine learning work

Graduate Mathematics Intern, NSA Graduate Mathematics Program – Maryland, USA Summer 2021

- Researched detection of synthesized speech using bispectrum analysis and topological data analysis
- Implemented and evaluated binary classifiers and neural networks for speech classification
- Co-authored internal paper and briefed findings to NSA leadership including the Director

Researcher, Center for Computational Mathematics & Modeling (C2M2), Temple University – Philadelphia, PA Sep. 2019 – Sep. 2022

- Developed Neuro-VISOR, a real-time VR simulation platform for neuronal networks using C#, Unity, and PDE solvers
- Created Python mesh generation software using parallel transport and 1D neuronal geometries
- Enabled real-time interaction of synaptic and electrical behavior in virtual environments used in classrooms

Researcher, Queisser Research Group, Temple University – Philadelphia, PA Sep. 2018 – Sep. 2022

- Developed HPC pipelines using MPI, FEM/FVM methods for calcium simulations under TMS
- Ran large-scale simulations on SDSC EXPANSE/COMET through NSF XSEDE awards (over 1.8M core-hours)
- Mentored students and collaborated across Temple, University of Minnesota, and University of Freiburg

Graduate Teaching Assistant, Temple University – Philadelphia, PA Sep. 2017 – June 2022

- Instructed undergraduate mathematics courses, designed exams, and mentored students in research
- Volunteered for MCC tutoring and led SIAM workshops and student research talks

- Adjunct Professor**, Rowan University – Glassboro, NJ Sep. 2016 – June 2017
- Taught evening Calculus I courses and maintained active student engagement through Canvas
 - Designed and graded assessments; provided regular student support and feedback
- Adjunct Professor (Online)**, Rowan University – Glassboro, NJ Sep. 2024 – Dec. 2024
- Administered and online mathematics course
 - Designed and graded assessments; provided regular student support and feedback via Canvas
- Adjunct Professor**, Towson University – Towson, MD Jan. 2025 – May 2025
- Taught an evening course in elementary mathematics
 - Designed and graded assessments; provided regular student support and feedback via Blackboard
- High School Mathematics Teacher**, Clearview Regional School District – Mullica Hill, NJ Sep. 2009 – June 2017
- Taught 9th–12th grade math, co-taught special education classes, and led night/homebound instruction
 - Developed interactive lessons aligned with NJ Core Content Standards and IEP accommodations
- Mathematics Researcher**, Rowan University – Glassboro, NJ Sep. 2012 – June 2016
- Developed and published finite frame partitioning algorithms using Mathematica and complex analysis
 - Presented work at the Joint Mathematics Meetings (JMM) and STEM symposia
- Private Tutor**, Gloucester County, NJ Sep. 2011 – June 2016
- Delivered one-on-one instruction from grade school through high school mathematics
 - Coordinated with parents and used manipulatives to reinforce student understanding

Publications

- Neuronal Resilience and Calcium Signaling Pathways in the Context of Synapse Loss and Calcium Leaks** Dec 2023
Rosado, J. M., Borole, P. R., Neal, M., Queisser, G.
SIAM Journal on Applied Mathematics, Vol. 83, Issue 6, pp. 2418–2442
- Multi-scale Modeling Toolbox for Single Neuron and Subcellular Activity Under TMS** Nov 2021
Rosado, J. M., Shirinpour, S., Hananeia, N., Tran, H., Galanis, C., Vlachos, A., Jedlicka, P., Queisser, G., Opitz, A.
Brain Stimulation, Vol. 14, Issue 6, pp. 1470–1482
- Calcium Modeling of Spine Apparatus-containing Human Dendritic Spines** Apr 2022
Rosado, J. M., Bui, V. D., Haas, C. A., Beck, J., Queisser, G., Vlachos, A.
PLOS Computational Biology, April 2022
- Partitions of Equiangular Tight Frames** Mar 2017
Rosado, J. M., Nguyen, H. D., Cao, L.
Linear Algebra and its Applications, Vol. 526, pp. 95–120
- A Table of Definite Integrals from the Marriage of Power and Fourier Series** Aug 2015
Rosado, J. M., Osler, T.
Scientia, Vol. 26, pp. 77–82
- Ultrastructural Neuronal Modeling of Calcium Dynamics Under TMS** (Doctoral Dissertation) May 2022
Rosado, James Michael
Temple University Libraries
- Partitions of Finite Frames** (Master's Thesis) June 2016
Rosado, James Michael

Projects

Neuro-VISOR: Virtual Interactive Simulation of Reality Developed at Temple University's C2M2 Lab for real-time VR simulation of neuronal dynamics. github.com/c2m2/Neuro-VISOR	2018 – 2022
NeMo-TMS: Neuron Modeling for TMS Multi-scale modeling toolbox to simulate transcranial magnetic stimulation effects on neurons. github.com/OpitzLab/NeMo-TMS	2018 – 2019
CalcSim: Calcium Dynamics Simulator MATLAB-based simulator for modeling intracellular calcium dynamics in single neurons. github.com/NeuroBox3D/CalcSim	2021 – 2023
PythonNeuronMeshes Python software for generating surface meshes from 1D neuron morphology using parallel transport methods. github.com/jarosado0911/PythonNeuronMeshes	2022 – Present

Technologies

Languages: C++, C, Python, Java, C#, MATLAB, LUA, Shell scripting, LaTeX

Technologies: Unity3D, Git, GitHub, GitLab, Atlassian Bitbucket, MPI, OpenMP, Blackboard, Canvas, PowerSchool, PowerTeacher

Libraries & Frameworks: TensorFlow, PyTorch, Scikit-learn, word2vec, uG4 (unstructured grid framework)

Tools: Zoom, Skype, Geometer's Sketchpad, TI-84 Graphing Calculator

Operating Systems: Linux (RedHat, CentOS), macOS, Windows

Awards

DoD/NSA Awards:

2025 Monetary Award – For contributing to improved software performance - \$2,000
2024 Monetary Award – For developing and implementing article recommendation systems - \$3,000
2024 Performance Coin Award – For work completed on ML-based recommendation systems
2023 Time Off Award – For advanced coding practices in software engineering - 16 hrs.
2023 Monetary Award – For performance involving advanced query-based algorithms - \$2,000

National Science Foundation HPC Awards:

2022 XSEDE Compute Research Award – \$2,440
2021 XSEDE Compute Research Award – \$2,440
2020 XSEDE Compute Research Award – \$12,873

Temple University Awards:

Mar. 2022 Dissertation Completion Grant – \$8,750
May 2020 First Summer Research Initiative Award – \$6,000
May 2022 Jay Novik Graduate Student Fellowship – \$5,000 for exceptional performance in the Graduate Mathematics Program
Summer 2019 NIH Brain Initiative Summer School Funding Award
Jan. 2019 Mathematics Department Excellence in Teaching Award – \$500
Nov. 2018 SIAM Recognition – Leadership and coordination of SIAM Chapter activities

Rowan University Awards:

2015–2016 Certificate of Achievement in Mathematics – For JMM participation and publishing
2014–2015 Certificate of Achievement in Mathematics – For JMM participation

Rutgers University Awards:

2003–2007 Edward J. Bloustein Distinguished Scholar

Presentations

June 2022 — “*Ultrastructural Neuronal Modeling of Calcium Dynamics Under Transcranial Magnetic Stimulation*”, Doctoral Defense, Temple University, Philadelphia, PA

Oct. 2021 — “*Neuron Dendritic Spines: Modeling Calcium Communication*”, CST Research Mixer, Temple University, Philadelphia, PA

May 2021 — “*Hodgkin-Huxley Conductance Based Model: From 1D to 3D*”, Numerical PDEs Course, Temple University, Philadelphia, PA

Jan. 2021 — “*Applied Mathematics: Modeling Neuronal Electrical and Ion Dynamics*”, Temple University, Philadelphia, PA

Dec. 2020 — “*PDE Based Image Reconstruction*”, Numerical PDEs Course, Temple University, Philadelphia, PA

Nov. 2020 — “*Modeling an Action Potential and Neuronal Behavior*”, Graduate Seminar, Temple University, Philadelphia, PA

Jan. 2020 — “*An Investigation of Spine to Dendrite Calcium Communication*”, Applied Mathematics Seminar, Temple University, Philadelphia, PA

Oct. 2019 — “*Inner Workings of a Neuron: A Mathematical Perspective*”, Temple University Math Club, Philadelphia, PA

May 2019 — “*A Walk Through Calculus of Variations*”, Methods in Applied Mathematics Course, Temple University, Philadelphia, PA

Dec. 2018 — “*Sturm-Liouville Theory: An Example*”, Methods in Applied Mathematics Course, Temple University, Philadelphia, PA

March 2018 — “*A Table of Definite Integrals from the Marriage of Power and Fourier Series*”, EPaDel Spring Section Meeting, Philadelphia, PA (with T. Osler)

Fall 2017 — “*Partitions of Equiangular Tight Frames*”, Graduate Student Seminar, Temple University, Philadelphia, PA

Jan. 2017 — “*Partitions of Equiangular Tight Frames*”, Joint Mathematics Meeting, Atlanta, GA (with H. Nguyen and L. Cao)

May 2016 — “*Partitions of Equiangular Tight Frames*”, STEM Symposium, Rowan University, Glassboro, NJ (with H. Nguyen and L. Cao)

April 2016 — “*Frame Partitioning Algorithms*”, Master’s Thesis Presentation, Rowan University, Glassboro, NJ

May 2015 — “*A Table of Definite Integrals from the Marriage of Power and Fourier Series*”, STEM Symposium, Rowan University, Glassboro, NJ (with T. Osler)

Aug. 2015 — “*A Table of Definite Integrals from the Marriage of Power and Fourier Series*”, MAA Mathfest, Washington, D.C. (with T. Osler)

May 2015 — “*A Table of Definite Integrals from the Marriage of Power and Fourier Series*”, Sigma Xi Research Symposium, St. Joseph’s University, Philadelphia, PA (with T. Osler)

Jan. 2015 — “*A Table of Definite Integrals from the Marriage of Power and Fourier Series*”, Joint Mathematics Meeting, San Antonio, TX (with T. Osler)

Undergraduate Research

Undergraduate Engineering Research, College of Engineering, Rowan University – Summer 2005
Glassboro, NJ

- Designed transistor-based replica of leech heart interneuron
- Modeled system using Hodgkin-Huxley formalisms for circuit-based neuron simulation
- Investigated FPGA experimentation using Mentor Graphics Advantage software

Undergraduate Research, College of Humanities and Social Sciences, Rowan University – Glassboro, NJ June 2000 – June 2003

- Conducted archaeological conservation at the Museum of La Serena, Chile
- Designed a statistical program to estimate human stature from archaeological remains
- Participated in archaeological site mapping and international research collaboration

Undergraduate Research (Abroad), Universidad Catolica del Norte – Coquimbo, Chile

June 2004

- Translated and analyzed ChemCAD software for shellfish cultivation system design
- Studied the aquacultural processes for farming and harvesting shellfish

Professional Affiliations

Sep. 2018 – June 2022 — Temple University SIAM Chapter President
Sep. 2018 – June 2022 — Temple University SIAM Chapter Member
Sep. 2018 – June 2022 — Society for Industrial and Applied Mathematics (SIAM) Member and Journal Subscriber
Sep. 2017 – June 2022 — American Mathematical Society (AMS) Member
Sep. 2017 – June 2022 — Mathematical Association of America (MAA) Member
Sep. 2015 – June 2017 — Rowan University Pi Mu Epsilon Chapter Member
Sep. 2015 – June 2017 — Pi Mu Epsilon National Mathematics Honor Society Member
Sep. 2008 – June 2017 — New Jersey Education Association (NJEA) Member
Sep. 2008 – June 2017 — Clearview Regional Education Association Union Member
Sep. 2006 – Sep. 2008 — Institute of Electrical and Electronics Engineers (IEEE) Member and Journal Subscriber

Hobbies

Reading: Neuroscience, mathematics, science fiction, history, poetry, biographies, philosophy, high fantasy

Creative pursuits: Writing mathematical articles and poetry, drawing, painting

Fitness: Running, weight lifting, hiking

Sports and entertainment: Attending MLB and NFL games (Orioles, Phillies, Ravens, Eagles), video games, board games

Leisure and travel: Exploring restaurants, breweries, wineries; traveling within the U.S. and abroad